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Survey on Some Pest and Diseases of Sugarcane Fields at RARS, Anakapalle, Andhra Pradesh, India

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Abstract

A scientific field trip was conducted at Regional Agricultural Research Station (RARS), Anakapaelle, Andhra Pradesh as a part of field visit of Post Graduation Students of Botany, Andhra University. During the field study, different pest and diseases of sugarcane were carefully identified and the diseased samples were collected in sterilized polythene bags for disease diagnosis. Among the pest and diseases, the predominant disease Red rot was examined and the control methods were adopted by the institution for the effective management of sugarcane productions. The common pests of insects, fungal, bacterial and mycoplasma diseases were identified in sugarcane fields of ARAS. And also the common weeds which highly compete with crop and influence the sugarcane yield were identified.

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Introduction

India is one of the largest sugarcane producers in the world, producing around 300 million tonnes of cane per annum. Production of the sugar is the second largest agro processing industry in the country after cotton and textiles (Pusappa, 2013). Sugarcane cultivation is found in Indian writings of the Vedic period (1400 to 1000 B.C.). It is now widely accepted that India is the original home of *Saccharum* species. New Guinea is the centre of origin of *Saccharum officinarum.* Sugarcane belongs to family Gramineae (Poaceae), class monocotyledons and order glumaceae, sub family panicoidae, tribe Andripogoneae and sub tribe saccharininea. *Saccharum* popularly called as sugarcane(common name in English), Hindi-Ganna, Ikh; Sanskrit- Ikshu, Khnda, Sarkara; Bengali- Paunda, Pundia; Telugu-Cheruku; Tamil-Poovan karumbu; Kannada-Patta patti kabbu; and Malayalam-Karimbu. The cultivated canes belong to two main groups are found in India, one is *S. barberi* - thin, hardy north Indian types (called Indian cane), highly rich in fibre and intermediate sugar content and the second type *S. officinarum* - thick, juicy, and low fibre with high sugar content. The newly formed Andhra Pradesh State, popularly known as the "Rice Bowl of India" has huge potential to develop by increase of several crop productions and their management.

Sugarcane is an important cash crop of India as well as in Andhra Pradesh. Pests and diseases constitute an important biotic stress in the cultivation of sugarcane and a serious limiting factor in the productivity of the

crop. In sugarcane weeds have been estimated to cause 12 to 72% reduction in cane yield depending upon the severity of infestation (DSD, 2013). Protection of the crop against these pests and diseases needs timely diagnosis of the problem and application of appropriate management tactics. Keeping it in mind, an extensive survey on pest and disease of sugarcane was conducted by authors along with Post Graduate students of Botany, at Regional Agricultural Research Station (ARAS-Anakapalli), a regional institute of Acharya N.G.Ranga Agricultural University. The study aimed to identify various pest and diseases for their effective management and also to create awareness and interest of research to the students of Plant pathology specialization.

Materials and methods

Field survey

A systematic field survey was conducted at sugar cane fields of ARAS, Anakapalle during February, 2015. This field trip was conducted to identify various pest and diseases of the Sugarcane crop with the help of experts of Pathology Department of ARAS, Anakapalle. During field visit different diseases of sugarcane caused by fungal, bacteria, nematodes and insects were identified and the infected plant parts like leaves, stems, inflorescence and other propagated parts were collected.

Collection of samples

Infected plant samples were collected in sterilized polythene bags and avoided to sunlight and the samples were preserved and examined at Plant pathology Laboratory, Andhra University. The photographs of infected parts at filed locations were taken with digital camera.

Identification of pathogens

Diseased parts of the sugarcane samples were cultured and examined under compound microscope. Various fungal, bacterial pathogenic agents were identified using relevant literature (Kalra, 1995; Ferreira and Comstock, 1993; Naidu, 2009; Paul, 2007; Srikanth et al., 2012; Satyagopal., 2014). Fungal and Bacterial agents were cultured on nutrient media and especially fungal pathogens were cultured on various fungal media such as PDA, CZA and other modified media.

Results

The study revealed that cultural practices and climatic conditions highly influenced the growth and spread of different pest and diseases and their agents. Several insect pests, fungal diseases, bacterial diseases, mycoplasma diseases, nematode diseases and common weeds were identified in the sugarcane fields of ARAS, Anakapalle (Table 1 and Fig. 1).

Table 1. Common pests and diseases of Sugarcane at fields of RARS, Anakapalle.

Borers	Sucking pests	Diseases	Broad leaf weeds	Grasses	Sedges	Nematodes
Early shoot borer	White woolly aphid	Red rot	Pigweed	Crabgrass	Purple nut sedge	Lesion nematode
Pink borer	Black bug	Wilt	Black nightshade	Barnyard grass	Flat sedge	Lance nematode
Top shoot borer	White fly	Smut	Common purslane	Bermuda grass		Reniform nematode
Root borer	Pyrilla	Top rot	False amaranth	Wild sugarcane		Root knot nematode
Internode borer	Mealy bug	Leaf scald	Carrot grass	Johnson grass		
Stalk borer	Mite	Ring spot	Horse purslane	Torpedo grass		
		Grassy shoot	Goat weed	Goose grass		
		Red striped disease	Tropical spider wort			
		Pineapple disease	False daisy			
		Mosaic disease	Spurge			
		Yellow Leaf Disease				

Fig. 1: Various diseases of sugarcane identified at fields of ARAS, Anakapalle. **a-c**- Red rot; **d-f**-Smut; **g** –Rust; **h-i-** Yellow Leaf Disease.

Among the pest, borers such as Early shoot borer, Pink borer, Top shoot borer and Root borer caused heavy loss and damage to sugarcane. The study exposed that sucking pests causes heavy loss of sugar content and quantity of juice of sugarcane stem. Different kinds of sucking pests like White woolly aphid, Black bug, Mealy bug were identified on leaves, inflorescence and stem parts of the sugarcane. Next to pests, fungal and bacterial diseases caused heavy loss and damage of crop and extremely decreased the crop yield. The well known common disease of sugarcane, Red rot caused by *Colletotrichum falcatum* was identified as most predominant diseases of the crop field. Fungal diseases such as wilt of sugarcane caused by *Fusarium moniliforme*, smut of sugarcane caused by *Ustilago scitaminea* and Grassy shoot caused by Mycoplasma like organism (MLO) were examined. Grassy shoot of the sugarcane widely appeared in the field and represented by stunted growth of plants with small, reduced leaves. Red striped disease of sugarcane caused by *Xanthomonas rubrilineans* also reported from sugarcane fields. Weeds of various families compete with crop for space and nutrients and influenced the growth and crop production of sugarcane. Weed plants such as broad leaved weeds, grasses, sedges were identified in sugarcane fields, among them *Amaranthus viridis* (Amaranthaceae), *Coronopus didymus* (Brassicaceae), *Solanum nigrum* (Solanaceae), *Portulaca oleracea* (Portualacaceae), *Digera arvensis* (Amaranthaceae), *Convolvulus arvensis* (Convolvulaceae), *Parthenium hysterophorus* (Asteraceae), *Trianthema portulacastrum* (Aizoaceae), *Ageratum conyzoides* (Asteraceae), *Commelina benghalensis* (Commelinaceae), *Eclipta alba* (Asteraceae), *Euphorbia hirta* (Euphorbiaceae), *Digiteria sanguinalis* (Poaceae), *Echinochloa crusgalli* (Poaceae), *Cynodon dactylon* (Poaceae), *Cyperus rotundus* L. (Cyperaceae) and *Cyperus iria* L. (Cyperaceae) reported commonly.

Discussion

Sugarcane cultivation is one of the major sources as an economic crop in several regions of Andhra Pradesh. Many farmers of Andhra Pradesh depend on the sugarcane production for their livelihood and increase of their social-economic status. Andhra Pradesh is one of the chief states of sugarcane production in South India and N.G Ranga Agricultural University focused the improvement of sugarcane yield and production of high yielding and resistance varieties of Sugarcane at ARAS, Anakapalle, Andhra Pradesh. To improve different management practices of Sugarcane, this regional institute carried extreme research on Sugarcane by establishment of various departments, and the division of Plant pathology is very essential among them. The management of sugarcane and the effective methods were employed in fields of sugarcane at ARAS campus. Many hectors of sugarcane was cultivated at ARAS campus and demonstrated numerous effective management practices to farmers and students and researchers. Among the 240 diseases of sugarcane in world, 36 types were identified in Andhra Pradesh. Theses pest and diseases causes an average of 10-15% loss of yield and 20-25% loss of quantity in sugarcane crop of Andhra Pradesh. The survey on pest and disease of sugarcane might be helpful to farmers and researchers to initiate effective management practices. Several pests and diseases were identified in fields of ARAS, and their effective control methods and management of sugarcane was exposed by the experts of ARAS. The sugarcane plants were highly infected by Red rot and other fungal diseases and their control practices were identified. The management of pest and diseases is very essential to crop improvement and eco-friendly approaches are highly effective. Currently, various natural enemies as biocontrol agents were investigated by various researchers to management pest and diseases of Sugarcane.

Conflict of interest statement

Authors declare that they have no conflict of interest.

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